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Getting Started

How to Get Help

.

WTC is committed to quality products, service and support. Our service department maintains an assistance hotline to assist with application or troubleshooting problems during normal business hours.

By Phone or Fax: To arrange for field service or warranty repair, call one of these numbers:

ITS	(248) 477-3900	Fax: (248) 477-8897
WTC Canada	(905) 433-1230	Fax: (905) 433-1257

The ITS telephone number offers 24-hour service, seven days a week. Before calling, make a note of any fault conditions, applicable software and hardware revision numbers. Record the part number of the enclosure (on the serial tag on the inside or front door of the enclosure). Also note the sequence of events leading to the problem, and the drawing numbers of the schematics you received with the enclosure.

By E-mail: When an immediate response is not critical, contact WTC at the following e-mail addresses:

welding-sales@weldtechcorp.com	Sales/Marketing Comments
welding-support@its-wtc.com	Technical Support

WTC's technical support will respond within 24 hours, Monday through Friday, to your e-mail requests. Please include your name, company name, location, product part and serial number and a description of the problem with your request. Be sure to indicate how you want us to respond, and include applicable phone and fax numbers with your e-mail address.

On the Web: Visit our Web site at: **www.weldtechcorp.com**

By Mail: Contact us by mail at the following addresses:

WTC
24775 Crestview Court
Farmington Hills, MI 48335

WTC Canada
240 Cordova Road
P. O. Box 8858
Oshawa, Ontario L1J 1N9

Symbols Used in This Manual

.

Danger!



This symbol will be used wherever failure to observe safety measures may result in death, severe bodily injury or considerable damage to property.

WARNING!



This symbol will be used wherever insufficient or lacking compliance with instructions may result in personal injury.



Caution:

This symbol will be used when insufficient or lacking compliance with the instructions may result in damage to equipment or files.

NOTE:

This convention informs the user about special features, or where to find more information.

Revision History

.

Revision	Release Date	Comments
1	3-05-02	Original release of Manual M-0301.
2	7-22-03	Updated manual to reflect new fault message descriptions.

Safety Warning

.

To the Operator:

Danger!



Lethal voltages are present when power is applied to the welding control. Refer all necessary service on this machine **ONLY to qualified maintenance personnel.**

Failure to observe basic electrical safety practices may cause serious injury or death.

Limited Warranty

.

WTC warrants that this product is free from defects in design, materials and workmanship for a period of one (1) year from the date of delivery. **IN CASE OF SUCH DEFECTS, WTC'S LIABILITY IS STRICTLY LIMITED TO REPAIR OR REPLACEMENT, FOB WTC, WTCOF ANY MATERIALS, PARTS, OR GOODS WHICH MAY BE DEFECTIVE, AT WTC'S EXCLUSIVE OPTION.**

The foregoing is subject to written notice of any defect being provided within one (1) year period. WTC shall make no allowance for repairs or alterations made by the buyer, and assumes no liability for costs of disassembly and reassembly of defective materials, parts or goods.

MATERIALS, PARTS OR GOODS FURNISHED BY SUPPLIERS ARE GUARANTEED ONLY TO THE EXTENT OF THE ORIGINAL MANUFACTURER'S EXPRESS WARRANTY. WTC SHALL NOT BE LIABLE FOR DEFECTS WITH RESPECT TO GOODS WHICH ARE MANUFACTURED AND CONFORM TO SPECIFICATIONS, DESIGNS, AND PRINTS SUPPLIED BY THE PURCHASER.

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.

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Copying, duplicating, selling or otherwise distributing this software is a violation of law.

WTC specifically does not authorize duplication of the software stored in the EEPROM without prior written authorization and payment of royalty fees.

Patents

.

WTC products are covered by one or more of the following patents held by WTC:

3,736,445	4,289,951	4,463,244	4,851,635	5,449,877
4,001,540	4,301,351	4,513,363	4,885,451	5,589,088
4,104,724	4,388,515	4,516,008	4,937,419	5,667,704
4,251,764	4,399,511	4,733,045	4,945,201	5,757,176
4,254,466	4,456,809	4,804,819	5,128,507	5,793,243
4,282,417	4,459,456	4,831,229	5,386,096	
4,289,948	4,459,457	4,849,873	5,424,506	

Additional patents are pending.

Working with Static-Sensitive Devices

.

This equipment contains electronic devices which are sensitive to electrostatic discharge. Observe the following warnings AT ALL TIMES, to prevent damage to these devices. Disregarding any of these warnings may cause damage to the equipment.

WARNINGS!



**NEVER remove any circuit board
with AC power applied.**

**NEVER use the personnel grounding system
described below when working with
voltages above 220 VAC.**

Personnel Grounding

Before touching any Electrostatic Discharge Sensitive (ESDS) devices or circuit boards, put on and wear an Electrostatic Discharge (ESD) wrist strap. Ground this strap through a one megohm (1 M Ω) resistor.

Handling or Moving ESDS Devices

Handle all circuit boards by their edges ONLY. NEVER touch the traces or edge pad connectors.

Transport, store and ship ESDS devices and circuit boards in a static shielding container. An acceptable container is either a static shielding bag or a static shielding tote. To be effective, either type of container MUST be closed.

NOTE:

Use ONLY static-shielding containers for transporting ESDS devices or circuit boards.

Workstation Requirements

If diagnostics are required, move the circuit board to an approved ESD workstation. A Static Safe Workstation must include a grounded ESD mat, wrist strap and cord. The measured static voltage at a workstation MUST NOT exceed 50 volts.

Contact Information

For detailed information about ESD precautions, contact

ESD Association

Phone: 315-339-6937

Web: www.esda.org

Fax: 315-339-6793

Cooling Water Requirements

.

The cooling water provided must comply with chemical and physical specifications as stated in the Resistance Welder Manufacturers' Association *Bulletin 5-005.05*:

- Maximum temperature not to exceed 104° F. (40° C.), or fall below the dew point of ambient air at about 70° F. (21° C.).
- Maximum pressure not to exceed 90 PSIG
- pH maintained between 7.0 and 8.0
- Maximum chloride content 20 parts per million (PPM)
- Maximum nitrate content 10 PPM
- Maximum sulfate content 100 PPM
- Maximum suspended solids content 100 PPM, non-abrasive
- Maximum total (suspended and dissolved) solids content 250 PPM
- Maximum calcium carbonate content 250 PPM
- Resistivity less than 2,000 ohms/cm at 25° C. (500 μ S)
- The hose used must be NO LESS THAN 18 in. long across the power voltages.

NOTE: *Water that is safe for drinking is generally sufficient for cooling water, provided it is filtered to eliminate sand and rust particles. In addition, temperature of the cooling water must NOT fall more than 2° C. below the temperature of the surrounding air.*

Water Flow Rate

In general, the SCRs require a MINIMUM flow rate of 0.5 gallon (2 liters) per minute. The recommended maximum is 1.0 gal (4 l.) per minute. Larger SCRs (2,100 A. or greater) may require a higher flow rate. Consult WTC for more information.

This warning applies ONLY to SCRs having cooling-water hosing connected either between tangs, or between tang and ground:

WARNING!



REMOVE POWER from the SCR if the cooling water is not flowing and the resistivity of the water is less than 2,000 ohms/cm @ 25° C, or conductivity is greater than 500 μ Siemens @ 25° C.

If water circulation stops or is interrupted while the power is on, leakage current through the water in the hose between the SCR tangs will cause gas bubbles to form. Current will arc across these voids, weakening or destroying the hose. Putting the water into circulation again develops pressure in the cooling circuit, consequently causing the hose to rupture. ***Therefore, WTC does NOT recommend the use of water savers with these SCRs.***

When magnetic contactors are used, they remove power from the SCR module and prevent destruction of the hose. If cooling manifolds are used (rather than hose), leakage current through the water can cause the same destructive action to occur while power is being applied. This can destroy the cement holding the manifold together, resulting in serious water leaks. (WTC's warranty specifically does NOT cover such failures.)

Hoses

If a cooling hose needs replacing, use a certified non-electrically conductive hose. Its inside diameter must NOT exceed 3/8". The hose between SCR tangs must be *at least* 18 inches long across the power voltages, where SCR tangs are directly cooled.

The Technitron T2075 Control 1

About the Technitron T2075 Weld Control

.

The Technitron T2075 weld control is a fixed-sequence, spot welding control. Welding current is supplied through up to 8 separate SCRs using 8 gun valves and 8 accessory valves. One SCR, one gun valve and one accessory valve can be programmed in any of 60 sequences. The sequences may be individually piloted or "chained" together.

The T2075 features separate modes of current control. This enables the control to weld accurately and reliably in constant-current mode. You can program weld current in terms of secondary (or primary) A., and that the programmed current is passed through the work piece regardless of dirt, oil or changes in the secondary circuit.

Weld current may be measured and controlled either

- On the primary of the weld transformer using a Current Transformer (CT), or
- On the secondary side of the transformer using a toroid coil.

In addition, you can still weld using the traditional percent of available current mode with Automatic Voltage Compensation (AVC). AVC mode programs current as a percentage and then automatically compensates for changes in primary voltage, to provide consistent weld quality.

Up to 60 unique weld sequences reside in nonvolatile memory. The sequences may be "chained" together for a string of uninterrupted welding operations, and/or may be chained in an interrupted then re-initiated as a "successive" set of welding operations. In addition to the possible 8 SCR contactors, the control has seven inputs and twelve outputs. The functions assigned to the I/O may be controlled by DIP switches.

Inputs and Outputs

.

The control has seven inputs and 12 outputs. The functions assigned to the I/O may be controlled by DIP switches or via downloading from a personal computer through the RS-485 Network port TS1.

Inputs

The inputs are

- FS1 – Initiate sequence 1 or Binary Pilot 1
- FS2 – Initiate sequence 2 or Binary Pilot 2
- FS3 – Initiate sequence 3 or Binary Pilot 4
- FS4 – Initiate sequence selected with the Data Entry Panel or Binary Pilot 8
- Control stop
- WELD – External weld/no weld
- PS/SS – Second Stage or Pressure Switch

Outputs

The outputs are

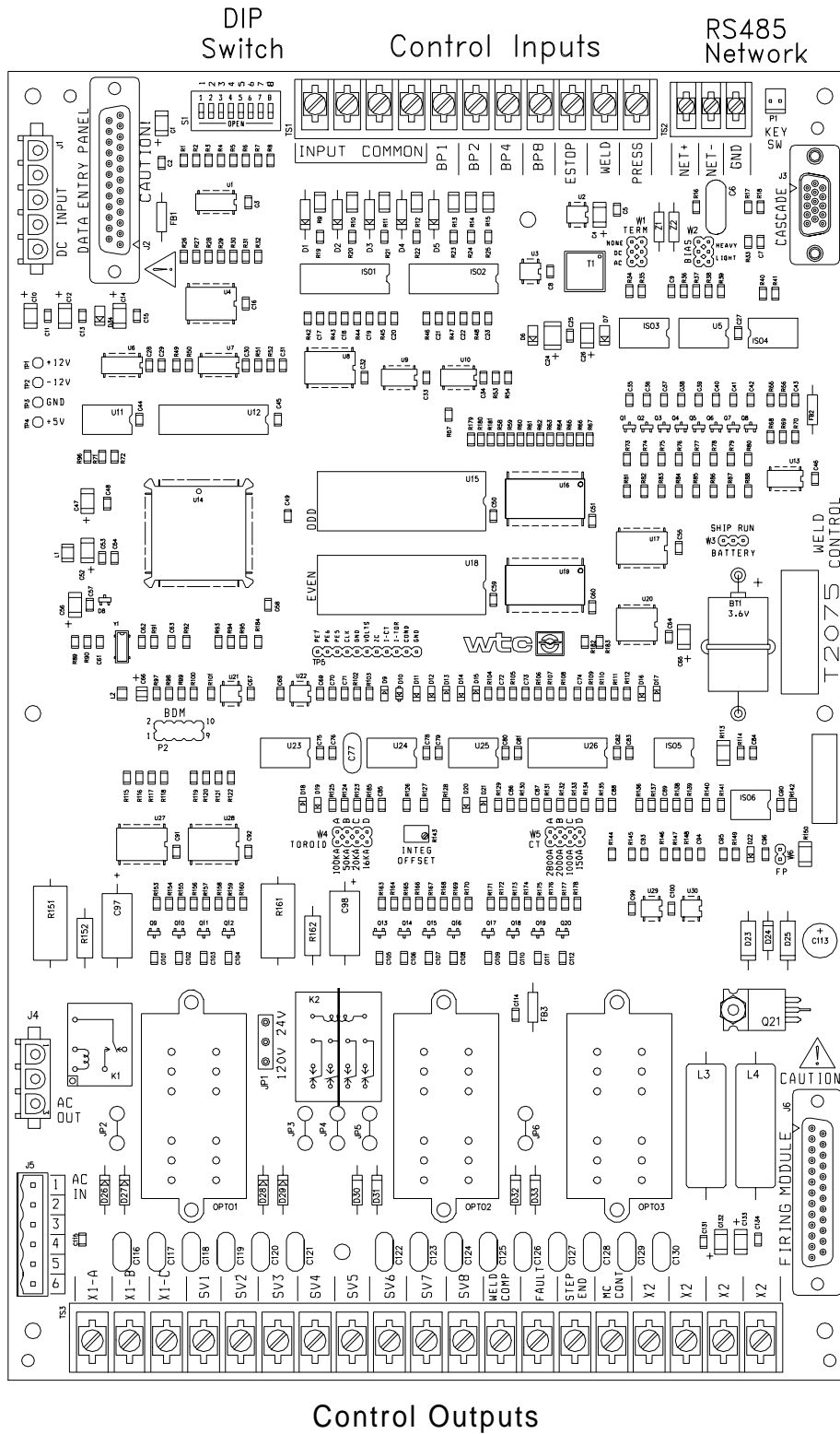
- VALVE1 – Solenoid Valve 1 or Binary Output 1
- VALVE2 – Solenoid Valve 2 or Binary Output 2
- VALVE3 – Solenoid Valve 3 or Binary Output 4
- VALVE4 – Solenoid Valve 4 or Binary Output 8
- VALVE5 – Solenoid Valve 5 or Binary Output 16
- VALVE6 – Solenoid Valve 6 or Binary Output 32
- VALVE7 – Solenoid Valve 7 or Binary Output 64
- VALVE8 – Solenoid Valve 8 or Binary Output 128
- WCOMP – The Weld is complete
- FAULT – A Fault has occurred
- STEP END – A stepper Program has ended
- MC – Mechanical Safety Contactor Control

All solenoid valve outputs are protected by a pilot safety relay (K2). K2 prevents possible unexpected gun closure due to failed output modules. Refer to the I/O hookup print, line 25.

T2075 Controller Board Layout 2

Figure 1 on page 4 illustrates the Controller board (p/n **900-8153-1**) used in the T2075 control.

Figure 1T 2075 Controller Board #900-8153 Layout



Feature Configuration Switches

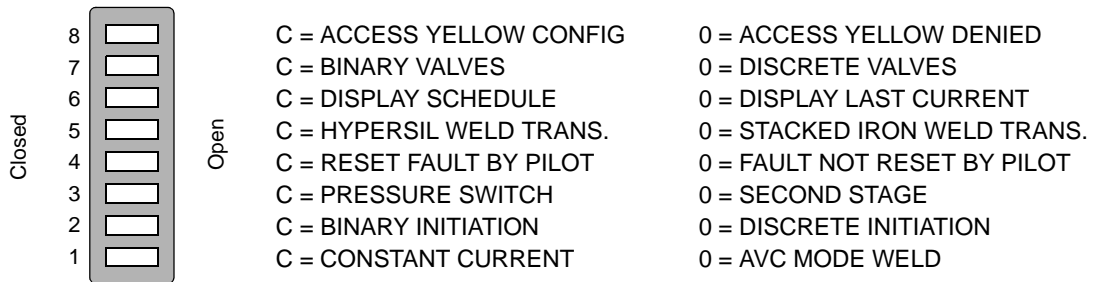
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The T2075 has two sets of feature configuration switches. They appear in two different forms:

- A set of *virtual* switches is controlled by the software residing in the EPROM.
- A set of DIP (Dual In-line Package) switches. They are on the controller PC board at S1, next to the input terminal strip.

The setting of the virtual switches may affect the features of the DIP SW1. A control running firmware version V2.04 will display **217** at power-up. In V2.00 the feature choices of SW1 are listed in Figure 2.

Figure 2 DIP Switches V2.00
Display = 134



Caution:

S1 is located near the edge of the T2075 board to the left of the input terminal strip (Figures 1 and 2). Proper switch settings are **CRITICAL** to satisfactory operation of the control. Be sure to study and understand these functions thoroughly.

DIP 1: Constant Current or AVC

.

CLOSED = CC (Constant Current)
OPEN = AVC (Automatic Voltage Compensation).

When **closed** (CC mode), all current values are programmed in actual current (A.). In Constant Current mode, entering 9.50 as the value for Weld Cur, the control will pass 9,500 A. through the gun during the WELD function, regardless of the amount of metal in the throat of the gun or metal stack-up. (This applies **ONLY** if the welding transformer can deliver the requested current and the control is able to read current properly.) Therefore, **DO NOT** use constant current mode initially. Check first in AVC mode how much current flows and how the control reads current at 20%, 50% and 99% in your application.

If **open** (AVC mode), all welding current is in percent of available current. If programming 50% for Weld Cur, the control will deliver 50% of the maximum current that the weld transformer and its secondary can deliver. If enabled, the AVC feature automatically adjusts the percent of available current maintain consistent weld quality, regardless of voltage fluctuations on the welding bus. Refer to “Faults and Messages” on page 27, *Compensation Fault*, before making your first weld. Use AVC mode for the first weld.

DIP 2: Binary Inputs ON/OFF

.

CLOSED = binary schedule initiation
OPEN = discrete schedule initiation.

If DIP 2 is in the **closed** position, then schedules 1 – 15 are selected by placing a binary combination on inputs FS1 – FS4. The first four inputs are, in order,

- **FS1:** Binary Pilot 1
- **FS2:** Binary Pilot 2
- **FS3:** Binary Pilot 4
- **FS4:** Binary Pilot 8

To choose which schedule to run, add up the appropriate binary pilot numbers to get the desired schedule. For example, to run schedule 3, energize BINARY PILOT 1 and BINARY PILOT 2 at the same time. To run schedule 4, energize only BINARY PILOT 4. To run schedule 5, energize BINARY PILOT 1 and BINARY PILOT 4 at the same time.

If DIP 2 is **open**, energizing FS1 will run schedule 1. FS2 will run schedule 2. FS3 will run schedule 3. FS4 will run the schedule selected on the Data Entry Panel. To select a schedule, use the **b** key under the **Sequence** column of the Data Entry Panel until the center row LED light is next to the Schedule instruction. Press the **Data t** and **b** keys to change the numeric display value until you reach the desired schedule number (1 – 60).

DIP 3: Pressure Switch or Second Stage1

.

CLOSED = Pressure switch
OPEN = Second stage.

When DIP 3 is in the **closed** (Pressure Switch) position, the schedule will execute the SQUEEZE DELAY and SQUEEZE instructions, then wait until the PS/SS input is made before executing any more instructions. After the sequence is initiated, the pilot may be removed and the sequence will still run to completion. If the pressure switch is not made after five seconds, the message **P_S** will appear on the Data Entry Panel's numeric display.

If DIP 3 is in the **open** (Second Stage) position, the schedule will execute the SQUEEZE DELAY and SQUEEZE instructions, then wait until the PS/SS input is made before executing any more instructions. The guns will open and the sequence will stop if the pilot is removed before the PS/SS input is made. If the Second Stage is not made after 5 seconds, the message **S_S** will appear on the DEP's numeric display.

DIP 4: Reset Fault by Pilot YES/NO

.

CLOSED = Reset faults by pilot
OPEN = Do not reset fault by pilot.

If DIP 4 is **closed** (reset faults by pilot), all faults will be cleared when a new pilot is applied. If the stepper has ended and not been reset, the STEPPER END fault will re-appear with the next weld.

If DIP 4 is **open** (do not clear faults with pilot), the control will not initiate until all faults (except COMPENSATION faults) have been cleared at the DEP.

DIP 5: Anti-Saturation ON/OFF

.

CLOSED = 87-degree delayed firing and automatic bleed-down enabled.

OPEN = 87-degree delayed firing and automatic bleed-down disabled.

When using Hypersil weld transformers, it is *essential* to use delayed firing and automatic bleed-down to avoid saturation. Saturation is characterized by a "grunting" noise coming from the transformer. This noise is the sound of the transformer magnetically tearing itself apart, which will eventually destroy it. When a transformer saturates, less total current passes through the part. This results in bad welds.

By contrast, stacked-iron transformers are very forgiving and difficult to saturate. If full welding power is needed without delay (as in a 1- or 2-cycle weld), then turn delayed firing (anti-saturation) OFF. When seam welding, Hypersil transformers are typically not used, and anti-saturation and automatic bleed-down are disabled.

DIP 6: Display Schedule or Last Current

.

CLOSED = Display schedule

OPEN = Display last current.

When DIP 6 is in the **closed** position and a schedule is initiated, the **SCHEDULE** LED will light and the schedule number running will appear on the DEP's numeric display.

If DIP 6 is **open**, the last average half-cycle RMS Weld current or the average half-cycle sum of Weld + Cool + Impulses programmed, will appear on the numeric display.

DIP 7: Binary Valves ON/OFF

.

CLOSED = Binary valves on
OPEN = Binary valves off.

When DIP 7 is **closed**, the eight valves will output a 0 – 255 binary number. Use this feature with a binary pressure valve, or when more than one output must be turned on at the same time for machine control. When using binary valves, only one stepper program is available. This assumes that you are using one gun with different pressures.

If DIP 7 is **open**, the valves function sequentially. Programming a number 1 – 8 will turn on a VALVE output 1 – 8.

DIP 8: One-Time Config ON/OFF

.

CLOSED = access to the One-Time Configuration items on the DEP is **enabled**.
OPEN = access to the One-Time Configuration items is **disabled**.

One-time configuration items are the items on the DEP in the yellow area of the **Config** column. These items are the weld transformer Turns Ratio, AVC set point, Program Lockout, Network ID, Cal Line Voltage and Cal CURRENT of the Data Entry Panel. Access to these instructions is restricted because once they are set up, *they should never be changed*. Cal Line Voltage and Cal Current values are set at the factory and *should NOT be changed*. If they are changed, your control may not operate properly until it is properly re-calibrated. A special keystroke sequence is needed to change calibration values so they are not changed accidentally.

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The Data Entry Panel (DEP)

Overview of the DEP

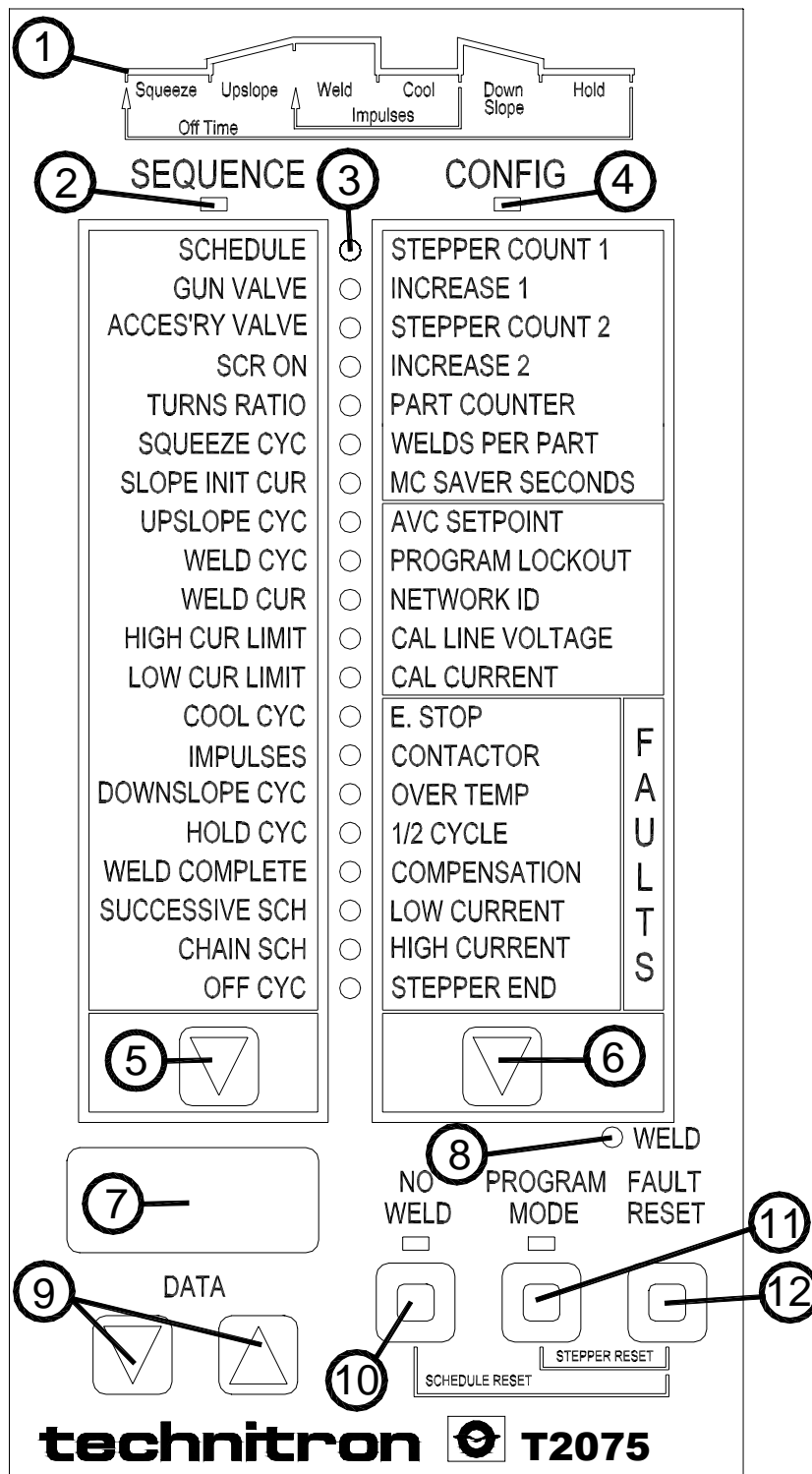
.

Figure 3 on page 12 illustrates the overlay of the Data Entry Panel (DEP). This is WTC p/n **937-0018**.

As an overview, these are the important features of the DEP:

1. Weld sequence diagram
2. **Sequence** column LED
3. **Instruction** indicator LED
4. **Config** column LED
5. **Sequence instruction** selector button
6. **Config instruction** selector button
7. Numeric display
8. **WELD** indicator LED
9. **DATA t** and **b** buttons
10. **NO WELD** button
11. **PROGRAM MODE** button
12. **FAULT RESET** button

Figure 3 DEP Overlay
(WTC #937-0018)



Details of the DEP's Features

.

Figure 3 on page 12 shows the T2075 DEP (Data Entry Panel) overlay. To aid in learning the DEP, all features are numbered and defined below:

1. **Weld sequence diagram**
This diagram shows the flow of sequence instructions as they execute.
2. **Sequence column LED**
This LED (Light Emitting Diode) lights to show that the **Sequence** column is active. Numbers displayed in the numeric display (7) are sequence instruction values.
3. **Instruction indicator LED**
This LED lights next to the currently-active instruction. The active column (either the welding Sequence or the control's Configuration) is indicated by the **Sequence** column LED (2) or the **Config** column LED (4).
4. **Config column LED**
The LED lights to show that the **Config** column is active. Numbers shown in the numeric display (7) are configuration instruction values.
5. **Sequence instruction selector button**
When pressed, the **Sequence** column LED (2) will light. The instruction indicator LED (3) will move down the column one instruction every time the button is pressed.
6. **Config instruction selector button**
When pressed, the **Config** column LED (4) will light. The instruction indicator LED (3) will move down the column one instruction every time the button is pressed.
7. **Numeric display**
The display shows programmed values, weld currents, control faults and status conditions.
8. **Weld LED**
The **WELD** LED turns on when the control is making an attempt to pass weld current. This includes Upslope, Downslope, Weld and Temper currents.
9. **DATA t and b buttons**
Press these buttons to change values displayed in the numeric display (7). If the control must be in Program mode to change a value, the letters **LOC** (short for *locked*) will appear when these buttons are pressed.
10. **NO WELD button**
When pressed, the control will toggle into and out of No Weld mode. In No Weld mode, the control will run through a sequence normally, but will NOT pass weld current. This is useful for testing tooling without actually welding.
11. **Program Mode button**
No sequence or configuration instructions can be changed unless the control is in Program mode. In this mode, the control will NOT run. Attempting to change a sequence or configuration items when not in Program mode, will display **LOC** in the numeric display. This reminds the operator to change into Program Mode before making any changes.

NOTE: *To enter into Program Mode from any screen, press the Program Mode (button 11) and Fault Reset (button 12) simultaneously.*

**12. FAULT RESET
button**

This button resets the fault currently displayed on the numeric display. It may be necessary to press this button more than once to clear multiple faults.

Fixed-Sequence Programming

.

The T2075 is a *fixed-sequence* control. This means that it executes all program instructions in order, and it executes all instructions. If you do not wish to use a function or instruction (such as steppers), you must program it to a value of **0**.

Two types of instructions can be entered with the Data Entry Panel (DEP):

- The first type is a *Sequence instruction*. Sequence instructions control valves, SCRs and weld currents when the control is initiated. All sequence instructions are located in the left-hand column of the DEP.
- The second type of instruction is called a *Configuration instruction*. A configuration instruction controls global functions that are common to more than one schedule or weld heat. All configuration instructions are located in the right-hand column of the DEP.

To select an instruction to program, press the **b** key directly under the instruction's column on the DEP (Figure 3 on page 12, items 5, 6). The LED directly above the column will light to indicate which column is active (Figure 3 on page 12, items 2, 4). The instruction indicator LEDs in the center of the Data Entry Panel (Figure 3 on page 12, item 3) shows which instruction you are currently editing. Repeatedly pressing the **b** key under a column moves the instruction indicator LED down the column, allowing you to edit new instructions. The numeric display shows the value of the item you are editing.

Weld Schedule Overview

.

When a schedule is initiated, the instruction indicator LEDs on the DEP (Figure 3 on page 12, item 3) will cycle down the list of instructions. This shows which item is currently being executed.

1. The first instruction to execute is GUN VALVE. The gun valve number programmed for the sequence is energized. If S1-7 is open (discrete valves), one valve (1 – 8) is energized. If S1-7 is closed (binary valves), a binary pattern of the programmed number (1 – 255) will be output on the 8 gun valves. In either case, if **0** is programmed, none of the 8 outputs will be energized. The GUN VALVE output is instantaneous; no time delay occurs. If entering the sequence by chaining from another sequence and the valve pattern is binary and the same valve is energized for a new binary number as the previous binary number, the valve will not be de-energized. It remains on for the new binary output.
2. The next instruction to execute is ACCESSORY VALVE. If the Accessory-Valve board is connected through J3 CASCADE on the **#900-8153-1** T2075 Weld Control board, or through C1SJ on the **#900-8133** Cascade board, the accessory valve number programmed for the sequence will be energized. If SW1-7 is open (discrete valves), one valve (1 – 8) is energized. If SW1-7 is closed (binary valves), a binary pattern of the programmed number (1 – 255) will be output on the 8 accessory valves. In either case, if **0** is programmed, none of the 8 outputs will be energized. The ACCESSORY VALVE output is instantaneous; no time delay occurs. If entering the sequence by chaining from another sequence and the valve pattern is binary and the same valve is energized for a new binary number as the previous binary number, the valve will not be de-energized. It remains on for the new binary output.
3. The next instruction to execute is SCR ON. This instruction selects which SCR (silicon controlled rectifier) is connected through J6 on the **#900-8153-1** T2075 weld control board. If a single SCR firing module is connected directly to J6, then only that SCR can be addressed. If Cascade board **#900-8133-1** is connected to J3 and J6, then one of up to 4 SCRs will be connected. If Cascade board **#900-8143-1** is connected to J3 and J6, then one of up to 8 SCRs will be connected. The SCR ON instruction consistently pauses for 2 line cycles. This delay is necessary for the Cascade board to transfer the SCR and give the control time to re-synchronize with the line. A chained program with all functions (except WELD programmed to **0**) will space welds exactly and consistently two cycles apart.

If the SQUEEZE time is programmed to **0**, half-cycling may occur.

4. The next instruction to execute is SQUEEZE. SQUEEZE pauses for the number of line cycles programmed, to give the weld electrodes time to completely close and build pressure.

5. After SQUEEZE, UPSLOPE TIME is executed. UPSLOPE starts at Slope Initial Current value and ramps up to the Weld Current value over the Upslope time in line cycles programmed in the instruction. To turn off UPSLOPE, enter a value of **0**.
6. Next, the weld is made using the parameters entered for Weld Cycles and Weld Current. To turn off WELD, enter **0** for Weld Cyc. Weld current (but not weld time) may also be turned off and on by pressing the **NO WELD** key, or by opening and closing the WELD input. The control is in No weld mode (no current) when the **NoWeld** LED is on.
7. COOL TIME then pauses for the number of line cycles programmed in the sequence with no heat. Turn off COOL TIME by programming **0** in the instruction.
8. At this point, Impulses will cause a branch back to WELD TIME if Pulses is programmed **greater than 1**. If Weld Pulses is set to **999**, the control will enter Seam Mode and continue to weld-pulse until the pilot is removed. If Cool time is programmed **0**, the seam will be continuous.



Caution:

The only way to stop 998 or other large number of programmed pulses before completion is to turn off the EMERGENCY STOP input. A mis-programmed number might result in very hot weld electrodes!

9. When all impulses are complete, DOWNSLOPE TIME is executed. Downslope starts at the Weld Current value and ramps down to the Slope End current value over the Downslope time in line cycles. To turn off DOWNSLOPE TIME, enter a value of **0**.
10. Then, HOLD TIME will pause in sequence, guns closed, for the programmed time. This gives the weld nugget time to fully solidify.
11. The welding process is now complete. All that remains is to de-energize the valve and release the work piece. The valve will be de-energized by one of two of the remaining functions, SUCCESSIVE or OFF. CHAIN SCH will not de-energize the valve. As soon as the valve is de-energized, WELD COMPLETE (if programmed **non-zero**) will energize the WCOMP output for the number of line cycles specified.

NOTE: *The WCOMP output will not be issued until the valve is off and OFF CYC is programmed **0** (i. e., single mode, non-repeat), or SUCCESSIVE is programmed **non-zero**.*

After the weld process is complete, the SUCCESSIVE SCH instruction (if programmed **non-zero**) will turn off any valve that was previously selected and wait for the pilot to be removed. If the pilot for the **same** schedule is re-applied, a branch to the VALVE instruction of the schedule that is programmed in SUCCESSIVE SCH will occur. If a **different** schedule is re-applied, the active sequence is ended and the "new" schedule is started. SUCCESSIVE SCH is used to make a series of different welds on a single part. SUCCESSIVE SCH allows up to 60 different weld schedules using the same pilot.

A string of successive schedules may be ended in any of three ways:

1. End normally by programming the last weld schedule's SUCCESSIVE instruction to **0**.
2. Apply a pilot that calls a different schedule outside the successive program.
3. Abort the successive sequence of schedules in progress by using this procedure:
 - a. Press and release the **PROGRAM** key until the **Sequence** and **Config** column LEDs are both OFF.
 - b. Press and hold the **FAULT RESET** key.
 - c. Press and release the **NO WELD** key.
 - d. Release the **FAULT RESET** key.
 - e. "**SCH**" will be displayed for 2 seconds and the successive schedules will be aborted.

If Successive schedules was programmed **0**, then the CHAIN SCHED instruction (if programmed **non-zero**) will cause a "branch" to the GUN VALVE instruction of the schedule that is programmed. Chaining schedules is used to control in uninterrupted cascade fashion different weld guns, SCRs, clamps and other solenoids.

Control of 16 valves in two groups of eight may be accomplished by using a different BINARY VALVE output pattern at the GUN VALVE and/or ACCESSORY VALVE instructions of each new schedule of a chain. After the output of a binary valve pattern, program **0** in the WELD functions and/or obtain proper delay timing in the SQUEEZE or HOLD function(s).

Sixty sequences are available for Successive or Chain Schedule use. To avoid endless loops, program a schedule **ONLY ONCE** in a successive chain of events. Successive (interrupted) and Chaining (non-interrupted) may be mixed to provide the desired control pattern. Binary valves may be used as many times as necessary in both.

Use the Binary function tables to assign up to 8 functions to the SV outputs. The tables will help you select the proper binary number to program in each schedule of the chain of events. Choose the valve output pattern necessary, mark the schedule number and SCR in the table for that step of the operation. Refer to “Binary Valve Function Tables—8 Binary Valves” on page 46 and Chapter 11, “Programming Example”.

A critical issue that must be addressed when chaining is safety relay K2. The relay contacts prevent outputting unless a schedule has been piloted (i. e., hands on the pilot). K2 is first energized by the pilot and then “latched” in by a SV valve output. If binary 0 is output during a chain, the latch will be lost and K2 will open valves SV1 – 8 for the remaining events.

To solve this problem, assign one of the SV outputs to maintain the latch of K2. Use jumpers JP2, JP3 and JP5 to jumper the K2 safety contacts. Consider removing this safety feature VERY CAREFULLY, or not at all.

Caution:

Safety relay K2 may be disabled for automated tooling through JP2 – JP5 (next to relays K1 and K2). See Figure 1 on page 4. NEVER disable K2 for hand-operated machinery where a shorted output module could result in a hand being pinched in a weld gun. Chain schedules may be dangerous in hand-held gun applications. Other safety devices must be employed if K2 is disabled. Otherwise, injury is possible.



Lastly, if SUCCESSIVE, CHAIN and OFF TIME are programmed **0**, all valve outputs will be turned off and the sequence will end. Only if OFF TIME is programmed to be **0** will the WELD COMPLETE output be energized for its programmed number of line cycles.

If a new pilot is received before the WELD COMPLETE output time is over, it will be truncated.

The control will NOT sequence again unless the pilot input is removed and re-applied. If the pilot is still applied, “**PIL**” will be displayed. If OFF is programmed **non-zero** and the pilot signal is still applied, the control will turn off the valve, wait for the programmed number of cycles, then repeat the sequence starting at the SQUEEZE instruction of the schedule applied. In Repeat mode, WELD COMPLETE will not be output.

Changing Programmed Values and Clearing Memory

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You can only edit values (except for the SCHEDULE instruction) when the control is in Program mode. If you purchased the optional keyswitch (installed on P-1), the control CANNOT be placed in Program mode unless the keyswitch is turned to the **Unlock** position.

To place the control in Program mode, press the **PROGRAM MODE** button on the DEP. The **PROGRAM MODE** LED will light to indicate that you have changed modes. To exit Program mode, press **PROGRAM MODE** again. The LED will turn off.

When the center LED next to a **Sequence** or **Config** item is on (Figure 3 on page 12, item 3), the value for that item appears in the numeric display. Edit the value by pressing the **DATA t** and **b** keys located below the numeric display.

Clearing Memory

Clearing memory requires a special procedure.

WARNING!



Performing this operation will ERASE ALL USER PROGRAM AND SETUP DATA! All configurable parameters are set to their default values. Calibration data is NOT erased.

To clear memory, follow these steps:

1. Enable "One-time" Configuration by **closing** switch SW1–8.
2. Make sure the **Sequence** and **Config** LEDs are both OFF and the control is in Program mode. Press and release the **PROGRAM MODE** key until only the **PROGRAM MODE** LED stays on.
3. Press and hold the **FAULT RESET** key.
4. Press and hold the **DATA t** key.
5. Press and release the **SCHEDULE b** key.
6. Release the **FAULT RESET** and **DATA t** keys.
7. The display will show "**CLr**" for 2 seconds and all programmable data will be set to the default values.
8. Restore the setting of switch SW1–8 to OFF.

Sequence Instruction Definitions

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Accessory Valve

Accessory Valve selects which of the ACCESSORY VALVE outputs will turn on when the schedule is initiated. If DIP switch S1-7 is closed (binary valve outputs) then the 8 VALVE outputs will turn on in a binary pattern representing a number from 0 to 255. If DIP switch S1-7 is open (discrete valves) programming a valve number from 0 to 8 will turn on output 1 – 8, respectively. In either case, if **0** is programmed, no valve is output. The data range is 0 – 8 discrete and 0 – 255 binary.

Chain Sch

If the number programmed is **non-zero** (1 – 60), the control will "branch" to the VALVE instruction of the sequence number that is entered. The OFF TIME instruction below will be skipped and is addressed in the last schedule in the chain that is executed. Also, the WELD COMPLETE output is not energized until the last schedule in the chain is executed and its Off Time is 0. If the Off Time is **non-zero** in the last weld schedule, WELD COMPLETE will not be issued and the control will repeat the entire chain of schedules.

A schedule CANNOT be chained to itself, and can be used **only once** in a chain. See "Weld Schedule Overview" on page 16, for more details.

Cool time

Cool time is the duration of time in line cycles during which no weld current is passed. Therefore, the weld nugget begins to cool. The range for this instruction is 0 – 99 cycles.

Downslope Cycles

The Downslope current will range from Weld Current to the Slope End Current over the Downslope Cycle time. The timing range is 0 – 99 cycles. For example, if Weld Cur is set to 60% of available current, and Downslope time is set to 5 cycles, then Downslope weld will start at the Weld Current value of 60% and ramp down to the Slope End current over the 5 cycles of time. Use Downslope to slow down the cooling of the nugget, to prevent cracking and brittle weld spots.

Gun Valve

Gun Valve selects which of the 8 valve outputs will turn on when the schedule is initiated. If DIP switch S1-7 is closed (binary valve outputs) then the 8 VALVE outputs will turn on in a binary pattern representing a number from 0 to 255. If DIP switch S1-7 is open (discrete valves), programming a valve number from 0 to 8 will turn on output 1 through 8, respectively. In either case, if **0** is programmed, no valve is output. The data range is 0 – 8 discrete and 0 – 255 binary.

High Current Limit

This is a programmable high current limit that is compared to the WELD function current (and COOL if programmed) after a weld is made. If Weld Current **exceeds** the HIGH limit, then the HIGH CURRENT fault is set. Separate High Current limits are programmable in each weld schedule. The data range is 0 – 65.5 kA. High Current Limit defaults to **65.5 kA** (off).

Hold Cyc The number of line cycles the control will pause for the weld nugget to solidify before continuing the sequence. The range for this instruction is 0 – 99 cycles.

Impulses The number of times the schedule loops back to the WELD CY instruction before the schedule moves on to HOLD CY. The range for this instruction is 1 – 999. If set to **1**, the sequence will not loop back to the WELD instruction, resulting in only 1 pulse of weld/cool. If set to **2**, the control will loop back once for 2 weld/cool pulses. Impulses are used to weld multi-layer or very thick material by controlling the time the heat is applied. If Impulses are set to **999**, the control will enter Seam or Roll Spot mode and deliver weld/cool pulses until the pilot is removed.

Low Current Limit This is a programmable low current limit that is compared to the WELD function current (and COOL if programmed) after a weld is made. If the Weld current is **less** than the LOW limit, the LOW CURRENT fault is set. Separate Low Current Limits are programmable in each weld schedule. The data range is 0 – 65.5 kA. To turn off Low Current Limit, set the value to **0**. Low Current Limit defaults to **0** (off).

Off Cyc If Off Time is 0, the SV VALVE outputs are turned off and the sequence ends. After the valves are off, the WCOMP output is energized for the time programmed in WELD COMPLETE. If the OFF Time is greater than **0**, the control is in Repeat mode. In Repeat mode, OFF Time turns off all VALVE outputs and pauses for the number of line cycles entered. When the delay is over, if the PILOT input is still on the sequence will repeat starting with the SQUEEZE instruction. WELD COMPLETE will not occur in Repeat mode. Use Repeat mode in hand gun operation where the operator may pull and hold the weld gun trigger, moving the gun around as the electrodes automatically open, re-close and weld. The range of this instruction is 0 – 99 cycles.

Schedule *Schedule* selects which weld schedule is being programmed when in Program mode. In Run mode, if DIP switch SW1–2 is open (Discrete Initiation), and input FS4 is energized, the schedule number entered here will run. The data range is 1 – 60.

SCR On This selects the SCR switch. If Cascade board **#900-8133** is connected to J3 and J6, then one of up to 4 SCRs will be connected. If Cascade board **#900-8143** is connected to J3 and J6, then one of up to 8 SCRs will be connected. SCR ON consistently pauses for 2 line cycles. This delay is necessary for the Cascade board to transfer the SCR and give the control time to re-synchronize with the line. A chained program with all functions (except WELD) programmed **0**, will result in welds spaced exactly and consistently 2 cycles apart.

Slope Initial Current

Upslope current (a weld area preheat or "cleaning" function) will range from the value programmed in this location up to the Weld Current value over the Upslope time in line cycles. The data range for this instruction is 20% – 99% in AVC Mode (SW1–1 **open**) or 0 – 65.5 kA. in Constant Current mode (SW1–1 **closed**). The control will accept a value larger than the Weld Current value, but will not deliver a current greater than the Weld current during the Upslope time. Therefore, the UPSLOPE function will only be up or possibly flat, but never down to Weld.

Squeeze

Squeeze is the amount of time required to close the electrodes and achieve full tip pressure. The data range is 0 – 99 line cycles.

Successive Sch

If programmed **non-zero** (1 – 60), the control will turn off any valve that was previously selected, issue a WELD COMPLETE if programmed **non-zero**, and wait for the pilot to be removed. If the pilot for the same schedule is re-applied, a branch to the VALVE instruction of the schedule that is programmed in Successive Sch will occur. If a different schedule is re-applied, the active sequence ends and the "new" schedule is started. Use SUCCESSIVE SCHEDULES to make a series of different welds on a single part using the same pilot successively. If SUCCESSIVE SCH is programmed **non-zero**, the CHAIN SCHEDULES and OFF functions below will not be accessible.

Turns Ratio

This is the welding transformer's turns ratio. The proper ratio must be entered for secondary current readout and control of constant secondary current. If set to **0**, a toroid coil will be used to read, display and control secondary current. Otherwise, the primary current times Turns Ratio is used. Therefore, if Turns Ratio is set to 1, the control will display and control primary current. If the ratio is wrong, the control will probably run into compensation limits trying to deliver an unattainable value.



Caution:

Changing the transformer tap changes the turns ratio.

The range for this instruction is 0 – 200. If the value is less than **100**, then the decimal point is used (i. e., 51.2). Find the ratio on the transformer tag or by dividing the secondary voltage by the primary voltage rating. If the transformer ratings cannot be found, apply a low voltage to the primary, read the secondary and divide. Small offsets between the calibrated value and the delivered value in constant current may be nullified by adjusting the tenths digit of Turns Ratio. This is especially useful when cascading between different transformers with different ratios and efficiencies.

- Upslope Cycles** The Upslope current will range from the Initial Current up to the Weld Current over the Upslope Time. The timing range is 0 – 99 cycles. For example, if your Weld Cur is set to 60% of available current, and Upslope Time is set to 5 cycles, then UPSLOPE WELD will start at the Initial Current value (or 60% if programmed higher) and ramp up to 60% of available current over the 5 cycles of time.
- Weld Complete** *Weld Complete* energizes the WCOMP output for the number of line cycles programmed.
- NOTE:** *The WCOMP output will not be issued until the valve is turned off and OFF CYC must be programmed to 0 (i. e., single mode, non-repeat only) or Successive is programmed non 0. For more details, see “Weld Schedule Overview” on page 16 and read the HOLD through OFF functions.*
- Weld Cur** The amount of current passed during WELD CY. This current may be programmed in terms of primary or secondary A. if S1–1 is **closed** (CC mode); or percent available current if S1–1 is **open** (AVC mode). Current ranges are 20% – 99% in AVC mode or 0 – 65.5 kA. in Constant Current mode. In CC mode, the display starts at **0** to **999A**, then shifts from **999A** to **1.0KA** and continues to **65.5KA**. Therefore, if no decimal point is displayed, the display is A. If a decimal point appears, the display is kA.
- Weld Cycles** The duration of the weld current in line cycles. The range is 0 – 99 cycles.

Configuration Item Definitions

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Stepper Count 1 There are eight programmable 2-step stepper programs. One program is assigned for each of the 8 valves. *Stepper Count 1* is the Step 1 stepper count for the Valve selected in the **Sequence** column. If binary valves (S1–7 closed) there is only one stepper, the same stepper for all valves. The Stepper count range is 0 – 65.5 k welds. The display starts at **0-999**, then shifts to **1.0-65.5K**.

To reset all eight stepper programs, press the **FAULT RESET** and **PROGRAM MODE** buttons at the same time.

Stepper Count 1 This is the Step 1 stepper count for the valve selected in the **Sequence** column. To disable the steppers, program **0** in Stepper Count 1 and Stepper Count 2.

Increase 1 *Increase 1* is the percentage that the current will increase over the course of Stepper Count 1. The range for this instruction is 80% –199%.

Stepper Count 2 This is the Step 2 stepper count for the valve selected in the **Sequence** column. Program **0** in Stepper Count 1 and Stepper Count 2 to disable the steppers.

Increase 2 *Increase 2* is the percentage that the current will increase over the course of Stepper Count 2. The range of this instruction is 80% –199%.

Parts Counter In Program mode, this location allows a part counter value to be entered. In Run mode, the actual part count (or the parts made) is displayed. When the actual parts made equals the value programmed, the **FAULT** output will turn on, the display will indicate "**P_C**" and the pilot will be inhibited. The fault and actual parts count will be reset in Run mode by going to **CONFIG** (LED on), **b** to **PART COUNTER** (LED on) and with the actual count displayed, press **FAULT RESET**. If "**P_C**" appears when pressing **FAULT RESET**, the fault (not the actual part count) will be reset. This permits one or more parts to be made and counted before the P_C fault re-appears.

Welds Per Part In Program mode, this location lets you program a "welds-per-part" value. In Run mode, the location will display the actual welds-per-part value. Normally, every weld is counted as a weld per part. When the actual welds per part equals the programmed value, Part Counter will be incremented. In Successive schedules operation, welds per part are counted for the "same pilot applied" and will not advance the Parts Counter until the completion of a full successive operation. Aborting or resetting a Successive operation will also reset the Welds Per Part counter.

MC Saver Seconds

This is the time delay before opening the Mechanical Safety Contactor (if one is used). The programmed delay **MUST** be short enough that the operator cannot touch the work piece before the contactor opens.

AVC Setpoint

AVC Setpoint is the voltage value that the Automatic Voltage Control algorithm pivots on. If set to **0**, the AVC system is turned off. If the control is in constant current mode, the LED next to **AVC Setpoint** on the DEP will not light. The AVC algorithm is not used in Constant Current mode.

Program Lockout

Program Lockout is in five levels. To change the lockout level, first close SW1–8. In Program mode, choose a new level. The new lockout level will be secured **ONLY** by **re-opening** SW1–8. After reopening SW1–8, when attempting to change a lockout item, access is denied and "**LOC**" is displayed. For any lockout level chosen, the operator can always select and display any schedule data or select a schedule to run in Discrete pilot mode. The lockout definitions are

- **Level 4:** Full access.
- **Level 3:** Full access except for certain restricted Config. items.
- **Level 2:** Full access except for all Config. items.
- **Level 1:** Access **ONLY** to the WELD function.
- **Level 0:** No access.

Network ID

This is the unique address of the weld control on a RS-485 networked system. The range is 0 – 64, where **0** is off-line.

Cal Line Voltage

Line Voltage calibration allows the user to enter a measured line voltage value. The range for this instruction is 0 – 999 VAC. A new value will be accepted **ONLY** when you

1. Exit Cal Line Voltage or Program mode, and
2. Answer the "?" (question, accept this new value?) prompt by pressing the **FAULT RESET** key. By pressing any other key, the control will not scale itself to the new voltage value.

Cal Current

This is a current calibration entered in A. or kA. (A. x 1,000). The range for this instruction is 0 – 999 A., then shifts to 1.00 – 65.5 kA. Appearance of the decimal point indicates the shift to kA. A new value is accepted **ONLY** when you

1. Exit Cal Current or exit Program mode, and
2. Answer the "?" (question, accept this new value?) prompt by pressing the **FAULT RESET** key. By pressing any other key, the control will not scale itself to the new current value. See Chapter 9, "Re-calibrating the T2075" for more details.

Faults and Messages

Fault LEDs on the Data Entry Panel

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When a fault listed on the DEP occurs, the LED next to the fault will blink on and off. This distinguishes the fault condition from a sequence instruction in the other column. One fault is displayed at a time, so that the proper message can be shown on the numeric display. Clearing a fault displays the next fault (if any). To clear faults, press the **FAULT RESET** button.

Following are definitions of the faults:

**EMERGENCY
STOP**

This indicates that the ESTOP input has been de-energized. The sequence is halted and the VALVE output is removed. The display will flash "**E_S**," for Emergency Stop. Emergency stop is monitored through U10.

CONTACTOR Fault

This indicates the voltage that should be developed across a SCR contactor that is off is missing. It means that the SCR is shorted, or the line voltage is disconnected. The contactor off voltage is checked before the valve is energized, to prevent the tips from closing energized. It is also checked during normal sequence operation. The display will flash "**C_F**," for Contactor Fault.

OVER TEMP Fault

This fault indicates that the over-temperature switch on the SCR is open. The display will flash "**O_F**," for Over temperature Fault.

1/2 CYCLE Fault

This indicates that the SCR failed to fire on time for three consecutive half-cycles of the same polarity. The display will flash "**H_F**" for Half cycle Fault. The SCR is monitored through the firing modules U01 and U03, through J6-13 and U29 and U30 on the 824639 board.

**COMPENSATION
Fault**

During the dynamic process of controlling weld current, the weld control tried to exceed 99% or go below 20% of available current. When this fault occurs, "**HI**" (Compensation over 99%) or "**LO**" (Compensation under 20%) will flash on the display to show the direction of the effort. It means that the control could not deliver the requested current and therefore the last spot weld may be bad. Refer to "Configuration Item Definitions" on page 25, *Turns Ratio* and *AVC Setpoint*.

Check the following items:

- Is the tap on the weld transformer set to deliver a requested AVC current and make good welds, at mid range of the percent of available current (40 – 80%)? **The control must have room to make corrections.** The closer the control is programmed to the limits, the more likely the faults will occur. Adjust the tap or change the secondary's impedance so that good welds are made at mid-range.
- If the control is in AVC mode, is the AVC set point near the actual line voltage? Temporarily disable AVC by entering **0**. If turning off AVC corrects the problem and Step 1 is true, then re-calibrate the line voltage.
- If the control is in Constant Current mode, place it in AVC mode. Make sure Step 1 is satisfied. Then make sure the control can read current to your satisfaction. Know what the transformer turns ratio is and enter it correctly. If everything is correct, when SW1–6 is open, the display should match the reading on a secondary current meter. Return the control to Constant Current mode.

**LOW CURRENT
Fault**

This denotes that the Low Current Limit has been exceeded. When this fault occurs, the actual current value will flash on the numeric display. The value displayed will be lower than the value programmed in Sequence Low Cur Limit. The FAULT output will be energized, but the cascade sequence WILL be completed. When cascading welds, use 99 cycles in Squeeze and Hold of each weld to determine which weld is outside the current window. A good current report will not flash and the FAULT light will not turn on. A bad current report will flash and the FAULT light will turn on.

**HIGH CURRENT
Fault**

This indicates that the High Current Limit has been exceeded. When this fault occurs, the actual current value will flash on the numeric display of the DEP. The value displayed will be higher than the value programmed in Sequence High Cur Limit. The FAULT output will be energized, but the cascade sequence WILL be completed. When cascading welds, use 99 cycles in Squeeze and Hold of each weld to determine which weld is outside the current window. A good current report will not flash and the FAULT light will not turn on. A bad current report will flash and the FAULT light will turn on.

STEPPER END

This indicates that one of the four stepper programs has ended. When this fault occurs, the numeric display will display "S_1," "S_2," "S_3," . . . or "S_8" to indicate which stepper has ended. To reset the stepper program, place the control in Program mode and press the **FAULT/STEPPER RESET** button. This resets ALL eight Stepper programs. If not using steppers, program **0** in both Stepper Count 1 and 2.

NOTE:

To place the control in Program Mode from any screen, press button the Program Mode (button 11) and Fault Reset (button 12) simultaneously.

List of Numeric Display Messages

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The following is a list of the numeric display messages.

Power-up Status	X.XX	Software version number on power-up, momentarily displayed.
	XXX	EPROM check sum, momentarily displayed after software version.
	E00	Memory Fault. A data check sum error occurred in Sequence , or Config or both. Review all data; change data in ONE function in BOTH Sequence and Configuration. The fault may be cleared only after the data change is made. Restore if necessary. This error will occur the first time new firmware and/or PC board is booted up. It may be caused by switching relay or valve noise applied to the microprocessor. Always apply snubbers across all relay and valve coils. Keep relays physically and electrically away from the microprocessor and its power source T1.
Hardware Faults	E01	Test Module reset, momentarily displayed.
	E02	System Reset, momentarily displayed.
	E03	Loss of clock reset, momentarily displayed.
	E04	<i>Not used.</i>
	E05	Halt monitor reset, momentarily displayed. (HC16 was lost, probably due to bus noise. See E00.)
	E06	Software watch dog reset, momentarily displayed. (HC16 was lost, probably due to bus noise. See E00.)
	E07	Power up reset (<i>masked off, not used</i>).
	E08	External reset (<i>masked off, not used</i>).

Control Faults	S_n	Stepper n program ended. <i>n</i> refers to the stepper number, which can be 1 – 8. S_1 denotes <i>Stepper 1 program ended</i> . S_2 denotes <i>Stepper 2 program ended</i> , etc. . . S_8 denotes <i>Stepper 8 program ended</i> .	
	E_S	Emergency Stop	
	C_F	Contactactor Fault	
	O_F	SCR Overtemp	
	H_F	Half Cycling Fault	
	ErH	Data out of range – Error High	
	ErL	Data out of range – Error Low	
	Err	System Error	
	LC	Line clock missing	
	HI	Compensation attempt over 99%	
	LO	Compensation attempt under 20%	
	Other Status Messages	PIL	The pilot is not clear at Off Single. Remove the pilot or press RESET (anti-repeat).
		rES	Stepper reset acknowledged, momentarily displayed.
?		Accept calibration value change? (If yes, press FAULT RESET .)	
LOC		Locked out, or not in Program mode.	
S_S		Second Stage Open, close to latch in sequence.	
P_S		Pressure Switch Open, close to continue sequence.	
CLr		Memory has been cleared (except Calibration Data).	
PrS		Program in Sequence was reset.	
SCH		Reset of Successive Schedules has been accomplished.	
P_C		The Part counter equals the counter's programmed value.	

Cascade Board (#900-8143)

7

The #900-8143 Cascade Board (Figure 4 on page 33) enables a T2075 Weld Controller board #900-8153 (Figure 1 on page 4) to address up to eight SCR contactors. If the 25-pin connector labeled **J6 Firing Module** is connected directly to a single Firing Module, the Weld Controller board will address only that Firing Module and SCR, regardless of the number programmed in SCR ON.

By connecting J6 to the 25-pin connector labeled **C1PA TIMER**, the weld control board (TIMER) can address up to eight SCRs. The SCR's Firing Modules are connected through C1SA – C1SH connectors labeled **SCR1 – SCR8**. Hardware control of which SCR is connected is through a 15-pin socket labeled **J3 CASCADE** (see Figure 1 on page 4). J3 must be connected to **C1PB**. Refer to Figure 4 on page 33 and hookup print DS-010188-01.

A single SCR is connected via control lines originating from J3. User selection of the SCR is by program under the **SCR ON** in the **Sequence** column of the DEP. Refer to Figure 3 on page 12.

NEVER make or break a connection when power is applied.

WARNING!



The SCR firing cables and Data Entry cable are all 25-pin M-F serial extension cables. Therefore, it is possible to incorrectly connect a cable. Be certain to double-check all connections BEFORE applying power.

During SCR connection, the red **SCR SELECT** LED will light to show which SCR is connected. At rest (by default), SCR #1 will be connected. Next to each red **SCR** LED is a green LED labeled **THERMO**. When a Firing Module is connected, the **THERMO** LED will light. If a Firing Module is connected and the **THERMO** LED is out, the SCR's thermal switch circuit is open and the SCR **OVERTEMP** fault (**O-F**) will stop operation.

The cables used to connect Firing Modules to the Cascade Board are 25-pin "D" M-F serial extension cables. The cable used to control SCR and/or Accessory Valve selection is a 15-pin "D" M-F video cable. These cables are normally available locally at most electronic supply houses.

Nine pins of J3 CASCADE (J3-1 through 9) are used to control eight outputs of the Accessory Valve board #824-0010. This board may be plugged directly into J3 if the Cascade board is not used. If the Cascade board is used and the Accessory Valve board is necessary, connect the Valve board into C1SJ of the Cascade board.

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Hints: Begin the initial start-up in AVC mode (set SW1-1 **open**). Set the tap on the weld transformer so that good welds are made at the midrange of the percent of available current (40 – 80%). Enter the proper transformer Turns Ratio. Before going to Constant Current mode, check the measurement of current (SW1-6 **open**).

Check at various percentages, making sure the control does not go over-range at high percentages. A control in over-range will "top out", displaying a value and then become unable to display any higher values. Record the tap setting, turns ratio and good weld current value. Then in **Constant Current** mode (SW1-1 closed), requesting the same current observed in AVC mode will result in that current maintained *constantly*.

Secondary Current Control

.

Secondary current readout and control is "turned on" by programming a Turns Ratio of **0**. You must have a toroid coil connected to the firing module's toroid terminals. The toroid coil is optional, and is not normally installed. The secondary current range is controlled by jumpers W4, where:

- D = 16 kA. max.
- C = 20 kA. max. (normal)
- B = 50 kA. max.
- A = 100 kA. max.

About the Calibration Process

.

The CAL CURRENT process forces the control to display the current value you think the value should be, for the last weld made. This process may be done for line voltage, primary and secondary current. After this calibration, the readout should match your instrumentation (whether it is correct or not).

Improper or no calibration will not affect the control's ability to deliver a percent of available current in AVC mode. The numerical current readout and Constant Current control are relative to the perception of the user. The control does not "care" what that value is, or what it means. The T2075 delivers (if it can) in constant current the requested value, based on the RMS current of the last weld and the value you told the control it was.

The greatest concern is that the current NOT exceed the maximum level permitted by the W jumper installed. The working current level should be in the middle, or somewhat mid-lower portion of the range chosen. If the working current is near the maximum, the percent of available current requested must also be near maximum. If the value is near the maximum and the percent of available current reported by the control is low, the peak current for that RMS value is probably in over-range. The computer units which represent the peak A. were at maximum, jammed at the largest number during the peak of the current crest wave form. To correct this computer unit "clipping" problem, choose the next higher current range. Re-weld and re-calibrate with the W jumper installed in the new range.

6. Divide the secondary current reading by the Turns Ratio of the weld transformer. The result is the primary current value. Are you sure you have the proper ratio? Does your transformer have taps?
7. The control must be in Program mode and the **CONFIG** and **CAL CURRENT** LEDs lit. With the **DATA** keys, enter the primary current value.
8. Press the **CONFIG b** key. "?" will be displayed. Press **FAULT RESET**.
9. Re-weld at different currents to confirm that the primary current readings now match your secondary current meter. (Primary x Turns Ratio = Secondary.) If not satisfied, re-calibrate now, to make sure the numbers match. Explore and record the range of current the system can deliver without incurring HI or LO compensation faults.
10. If Constant Current mode will be used, or you want to see secondary current on the display, program the Turns Ratio used in Step 6. Correct any slight offset between the current displayed and your secondary meter by changing the Turns Ratio's tenths value. If cascading to different transformers, make sure the proper turns ratio is entered for each transformer that is connected in each sequence. Adjust the tenths value for proper current display for each transformer.

Hint: If your transformer has taps, now is the time to determine the turns ratio for each tap. If you change taps, you **MUST** program the new value. **DO NOT RE-CALIBRATE**. Instead, program the proper Turns Ratio.

Secondary Current Calibration Procedure

.

To calibrate secondary current, follow this procedure:

1. Choose a secondary current range (W4) that cannot be exceeded at a 99% available current weld.
2. Turn off power and set SW1-1 to be OPEN (AVC Mode).
3. Program a simple weld schedule:

```
    TURNS RATIO =0
    SQUEEZE 20 CY
    WELD TIME 15 CYCLES
    WELD CUR 65%
    HOLD 10 CY
    OFF 0 CY
```

4. Turn all other functions OFF (set to **0**), except Gun Valve, SCR and Impulses = **1**.

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Three-Cascade Weld Programming Example

.

This is a simple programming example. Refer to this table and the following explanation of the process:

Schedule	SCR #	Valve #	Gun #1	Gun #2	Gun #3	SV4
			SV1	SV2	SV3	
#1 GOTO #2	1	7	ON	ON	ON	OFF
#2 GOTO #3	2	6	OFF	ON	ON	OFF
#3 GOTO OFF	3	4	OFF	OFF	ON	OFF

1. In the first row, Schedule #1 calls SCR #1, turns on binary valve #7 (turning on all three weld guns), and is chained to Schedule #2.
2. In the next row, Schedule #2 calls SCR #2, turns on binary valve #6 (turning off Gun #1), and is chained to Schedule #3.
3. In the third row, Schedule #3 calls SCR #3, turns on binary valve #4 (turning off Guns #1 and #2), and goes to OFF.

This ends the chain.

Binary Valve Function Tables—8 Binary Valves

.

The following are Binary Valve Function tables for 8 binary valves:

Schedule	SCR #	Valve #	SV1	SV2	SV3	SV4	SV5	SV6	SV7	SV8
GOTO		0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
GOTO		1	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
GOTO		2	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
GOTO		3	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
GOTO		4	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
GOTO		5	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF
GOTO		6	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF
GOTO		7	ON	ON	ON	OFF	OFF	OFF	ON	OFF
GOTO		8	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
GOTO		9	ON	OFF	OFF	ON	OFF	OFF	OFF	OFF
GOTO		10	OFF	ON	OFF	ON	OFF	OFF	OFF	OFF
GOTO		11	ON	ON	OFF	ON	OFF	OFF	OFF	OFF
GOTO		12	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF
GOTO		13	ON	OFF	ON	ON	OFF	OFF	OFF	OFF
GOTO		14	OFF	ON	ON	ON	OFF	OFF	OFF	OFF
GOTO		15	ON	ON	ON	ON	OFF	OFF	OFF	OFF
GOTO		16	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
GOTO		17	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
GOTO		18	OFF	ON	OFF	OFF	ON	OFF	OFF	OFF
GOTO		19	ON	ON	OFF	OFF	ON	OFF	OFF	OFF
GOTO		20	OFF	OFF	ON	OFF	ON	OFF	OFF	OFF
GOTO		21	ON	OFF	ON	OFF	ON	OFF	OFF	OFF
GOTO		22	OFF	ON	ON	OFF	ON	OFF	OFF	OFF
GOTO		23	ON	ON	ON	OFF	ON	OFF	OFF	OFF

Schedule	SCR #	Valve #	SV1	SV2	SV3	SV4	SV5	SV6	SV7	SV8
GOTO		53	ON	OFF	ON	OFF	ON	ON	OFF	OFF
GOTO		54	OFF	ON	ON	OFF	ON	ON	OFF	OFF
GOTO		55	ON	ON	ON	OFF	ON	ON	OFF	OFF
GOTO		56	OFF	OFF	OFF	ON	ON	ON	OFF	OFF
GOTO		57	ON	OFF	OFF	ON	ON	ON	OFF	OFF
GOTO		58	OFF	ON	OFF	ON	ON	ON	OFF	OFF
GOTO		59	ON	ON	OFF	ON	ON	ON	OFF	OFF
GOTO		60	OFF	OFF	ON	ON	ON	ON	OFF	OFF
GOTO		61	ON	OFF	ON	ON	ON	ON	OFF	OFF
GOTO		62	OFF	ON	ON	ON	ON	ON	OFF	OFF
GOTO		63	ON	ON	ON	ON	ON	ON	OFF	OFF
GOTO		64	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
GOTO		65	ON	OFF	OFF	OFF	OFF	OFF	ON	OFF
GOTO		66	OFF	ON	OFF	OFF	OFF	OFF	ON	OFF
GOTO		67	ON	ON	OFF	OFF	OFF	OFF	ON	OFF
GOTO		68	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
GOTO		69	ON	OFF	ON	OFF	OFF	OFF	ON	OFF
GOTO		70	OFF	ON	ON	OFF	OFF	OFF	ON	OFF
GOTO		71	ON	ON	ON	OFF	OFF	OFF	ON	OFF
GOTO		72	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF
GOTO		73	ON	OFF	OFF	ON	OFF	OFF	ON	OFF
GOTO		74	OFF	ON	OFF	ON	OFF	OFF	ON	OFF
GOTO		75	ON	ON	OFF	ON	OFF	OFF	ON	OFF
GOTO		76	OFF	OFF	ON	ON	OFF	OFF	ON	OFF
GOTO		77	ON	OFF	ON	ON	OFF	OFF	ON	OFF
GOTO		78	OFF	ON	ON	ON	OFF	OFF	ON	OFF
GOTO		79	ON	ON	ON	ON	OFF	OFF	ON	OFF
GOTO		80	OFF	OFF	OFF	OFF	ON	OFF	ON	OFF
GOTO		81	ON	OFF	OFF	OFF	ON	OFF	ON	OFF

Schedule	SCR #	Valve #	SV1	SV2	SV3	SV4	SV5	SV6	SV7	SV8
GOTO		111	ON	ON	ON	ON	OFF	ON	ON	OFF
GOTO		112	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
GOTO		113	ON	OFF	OFF	OFF	ON	ON	ON	OFF
GOTO		114	OFF	ON	OFF	OFF	ON	ON	ON	OFF
GOTO		115	ON	ON	OFF	OFF	ON	ON	ON	OFF
GOTO		116	OFF	OFF	ON	OFF	ON	ON	ON	OFF
GOTO		117	ON	OFF	ON	OFF	ON	ON	ON	OFF
GOTO		118	OFF	ON	ON	OFF	ON	ON	ON	OFF
GOTO		119	ON	ON	ON	OFF	ON	ON	ON	OFF
GOTO		120	OFF	OFF	OFF	ON	ON	ON	ON	OFF
GOTO		121	ON	OFF	OFF	ON	ON	ON	ON	OFF
GOTO		122	OFF	ON	OFF	ON	ON	ON	ON	OFF
GOTO		123	ON	ON	OFF	ON	ON	ON	ON	OFF
GOTO		124	OFF	OFF	ON	ON	ON	ON	ON	OFF
GOTO		125	ON	OFF	ON	ON	ON	ON	ON	OFF
GOTO		126	OFF	ON	ON	ON	ON	ON	ON	OFF
GOTO		127	ON	ON	ON	ON	ON	ON	ON	OFF
GOTO		128	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
GOTO		129	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON
GOTO		130	OFF	ON	OFF	OFF	OFF	OFF	OFF	ON
GOTO		131	ON	ON	OFF	OFF	OFF	OFF	OFF	ON
GOTO		132	OFF	OFF	ON	OFF	OFF	OFF	OFF	ON
GOTO		133	ON	OFF	ON	OFF	OFF	OFF	OFF	ON
GOTO		134	OFF	ON	ON	OFF	OFF	OFF	OFF	ON
GOTO		135	ON	ON	ON	OFF	OFF	OFF	OFF	ON
GOTO		136	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
GOTO		137	ON	OFF	OFF	ON	OFF	OFF	OFF	ON
GOTO		138	OFF	ON	OFF	ON	OFF	OFF	OFF	ON
GOTO		139	ON	ON	OFF	ON	OFF	OFF	OFF	ON

Schedule	SCR #	Valve #	SV1	SV2	SV3	SV4	SV5	SV6	SV7	SV8
GOTO		169	ON	OFF	OFF	ON	OFF	ON	OFF	ON
GOTO		170	OFF	ON	OFF	ON	OFF	ON	OFF	ON
GOTO		171	ON	ON	OFF	ON	OFF	ON	OFF	ON
GOTO		172	OFF	OFF	ON	ON	OFF	ON	OFF	ON
GOTO		173	ON	OFF	ON	ON	OFF	ON	OFF	ON
GOTO		174	OFF	ON	ON	ON	OFF	ON	OFF	ON
GOTO		175	ON	ON	ON	ON	OFF	ON	OFF	ON
GOTO		176	OFF	OFF	OFF	OFF	ON	ON	OFF	ON
GOTO		177	ON	OFF	OFF	OFF	ON	ON	OFF	ON
GOTO		178	OFF	ON	OFF	OFF	ON	ON	OFF	ON
GOTO		179	ON	ON	OFF	OFF	ON	ON	OFF	ON
GOTO		180	OFF	OFF	ON	OFF	ON	ON	OFF	ON
GOTO		181	ON	OFF	ON	OFF	ON	ON	OFF	ON
GOTO		182	OFF	ON	ON	OFF	ON	ON	OFF	ON
GOTO		183	ON	ON	ON	OFF	ON	ON	OFF	ON
GOTO		184	OFF	OFF	OFF	ON	ON	ON	OFF	ON
GOTO		185	ON	OFF	OFF	ON	ON	ON	OFF	ON
GOTO		186	OFF	ON	OFF	ON	ON	ON	OFF	ON
GOTO		187	ON	ON	OFF	ON	ON	ON	OFF	ON
GOTO		188	OFF	OFF	ON	ON	ON	ON	OFF	ON
GOTO		189	ON	OFF	ON	ON	ON	ON	OFF	ON
GOTO		190	OFF	ON	ON	ON	ON	ON	OFF	ON
GOTO		191	ON	ON	ON	ON	ON	ON	OFF	ON
GOTO		192	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON
GOTO		193	ON	OFF	OFF	OFF	OFF	OFF	ON	ON
GOTO		194	OFF	ON	OFF	OFF	OFF	OFF	ON	ON
GOTO		195	ON	ON	OFF	OFF	OFF	OFF	ON	ON
GOTO		196	OFF	OFF	ON	OFF	OFF	OFF	ON	ON
GOTO		197	ON	OFF	ON	OFF	OFF	OFF	ON	ON

Schedule	SCR #	Valve #	SV1	SV2	SV3	SV4	SV5	SV6	SV7	SV8
GOTO		227	ON	ON	OFF	OFF	OFF	ON	ON	ON
GOTO		2289	OFF	OFF	ON	OFF	OFF	ON	ON	ON
GOTO		229	ON	OFF	ON	OFF	OFF	ON	ON	ON
GOTO		230	OFF	ON	ON	OFF	OFF	ON	ON	ON
GOTO		231	ON	ON	ON	OFF	OFF	ON	ON	ON
GOTO		232	OFF	OFF	OFF	ON	OFF	ON	ON	ON
GOTO		233	ON	OFF	OFF	ON	OFF	ON	ON	ON
GOTO		234	OFF	ON	OFF	ON	OFF	ON	ON	ON
GOTO		235	ON	ON	OFF	ON	OFF	ON	ON	ON
GOTO		236	OFF	OFF	ON	ON	OFF	ON	ON	ON
GOTO		237	ON	OFF	ON	ON	OFF	ON	ON	ON
GOTO		238	OFF	ON	ON	ON	OFF	ON	ON	ON
GOTO		239	ON	ON	ON	ON	OFF	ON	ON	ON
GOTO		240	OFF	OFF	OFF	OFF	ON	ON	ON	ON
GOTO		241	ON	OFF	OFF	OFF	ON	ON	ON	ON
GOTO		242	OFF	ON	OFF	OFF	ON	ON	ON	ON
GOTO		243	ON	ON	OFF	OFF	ON	ON	ON	ON
GOTO		244	OFF	OFF	ON	OFF	ON	ON	ON	ON
GOTO		245	ON	OFF	ON	OFF	ON	ON	ON	ON
GOTO		246	OFF	ON	ON	OFF	ON	ON	ON	ON
GOTO		247	ON	ON	ON	OFF	ON	ON	ON	ON
GOTO		248	OFF	OFF	OFF	ON	ON	ON	ON	ON
GOTO		249	ON	OFF	OFF	ON	ON	ON	ON	ON
GOTO		250	OFF	ON	OFF	ON	ON	ON	ON	ON
GOTO		251	ON	ON	OFF	ON	ON	ON	ON	ON
GOTO		252	OFF	OFF	ON	ON	ON	ON	ON	ON
GOTO		253	ON	OFF	ON	ON	ON	ON	ON	ON
GOTO		254	OFF	ON	ON	ON	ON	ON	ON	ON
GOTO		255	ON	ON	ON	ON	ON	ON	ON	ON

3. Next, Schedule #3 calls SCR #1, turns on binary valve #1 (turning off Gun #1), and is chained to Schedule #4.
4. In the fourth row, Schedule #4 calls SCR #2, turns on binary valve #5 (turning on Gun #2), and is chained to Schedule #5.
5. In the last row, Schedule #5 calls SCR #1, turns on binary valve #0 (turning off the clamp and Gun #2), and goes to OFF.

This ends the chain. The following sections describe how to program this example:

Assign Schedule #1

.

1. Assign Schedule #1 to clamp and align the parts before making the first spot weld:

<u>Function</u>	<u>Comment</u>
SCHEDULE=1	
GUN VALVE =1	;Energize the gauging clamp SV1
ACCES'RY VALVE	;N/A
SCR=1	;Defaults to 1 but will not weld. No
	;weld time programmed.
TURNS RATIO xxx	;N/A
SQUEEZE=40	;Give the clamp time to align the
	;parts.
UPSLOPE CYC=0	;N/A
UPSLOPE CUR=20	;N/A
WELD CYC=0	;N/A
WELD CUR=20%	;N/A
HIGH CUR LIMIT	;N/A
LOW CUR LIMIT	;N/A
COOL=0	;N/A
IMPULSES=1	;N/A
DOWNSLOPE CYC=0	;N/A
HOLD CYC=10	;N/A
WELD COMPLETE=0	;N/A
SUCCESSIVE SCH=0	;N/A
CHAIN SCH=2	;The part is now clamped go to
	;Schedule #2 and make the first weld.
OFF CYC=0	;N/A the sequence jumped to Schedule
	;#2.

Assign Schedule #3

.

3. Assign Schedule #3 to re-clamp the parts with SV1 before the second spot weld is made:

<u>Function</u>	<u>Comment</u>
SCHEDULE=3	
GUN VALVE =1	;Energize the gauging clamp SV1.
ACCES'RY VALVE	;N/A
SCR=1	;N/A
TURNS RATIO xxx	;N/A
SQUEEZE=40	;Give the clamp time to align the
	;parts.
UPSLOPE CYC=0	;N/A
UPSLOPE CUR=20	;N/A
WELD CYC=0	;N/A
WELD CUR=20%	;N/A
HIGH CUR LIMIT	;N/A
LOW CUR LIMIT	;N/A
COOL=0	;N/A
IMPULSES=1	;N/A
DOWNSLOPE CYC=0	;N/A
HOLD CYC=10	;N/A
WELD COMPLETE=0	;N/A
SUCCESSIVE SCH=0	;N/A
CHAIN SCH=4	;The part is now clamped. Go to
	;Schedule #4 and make the second spot
	;weld.
OFF CYC=0	;N/A the sequence jumped to Schedule
	;#4.

Assign Schedule #5

.

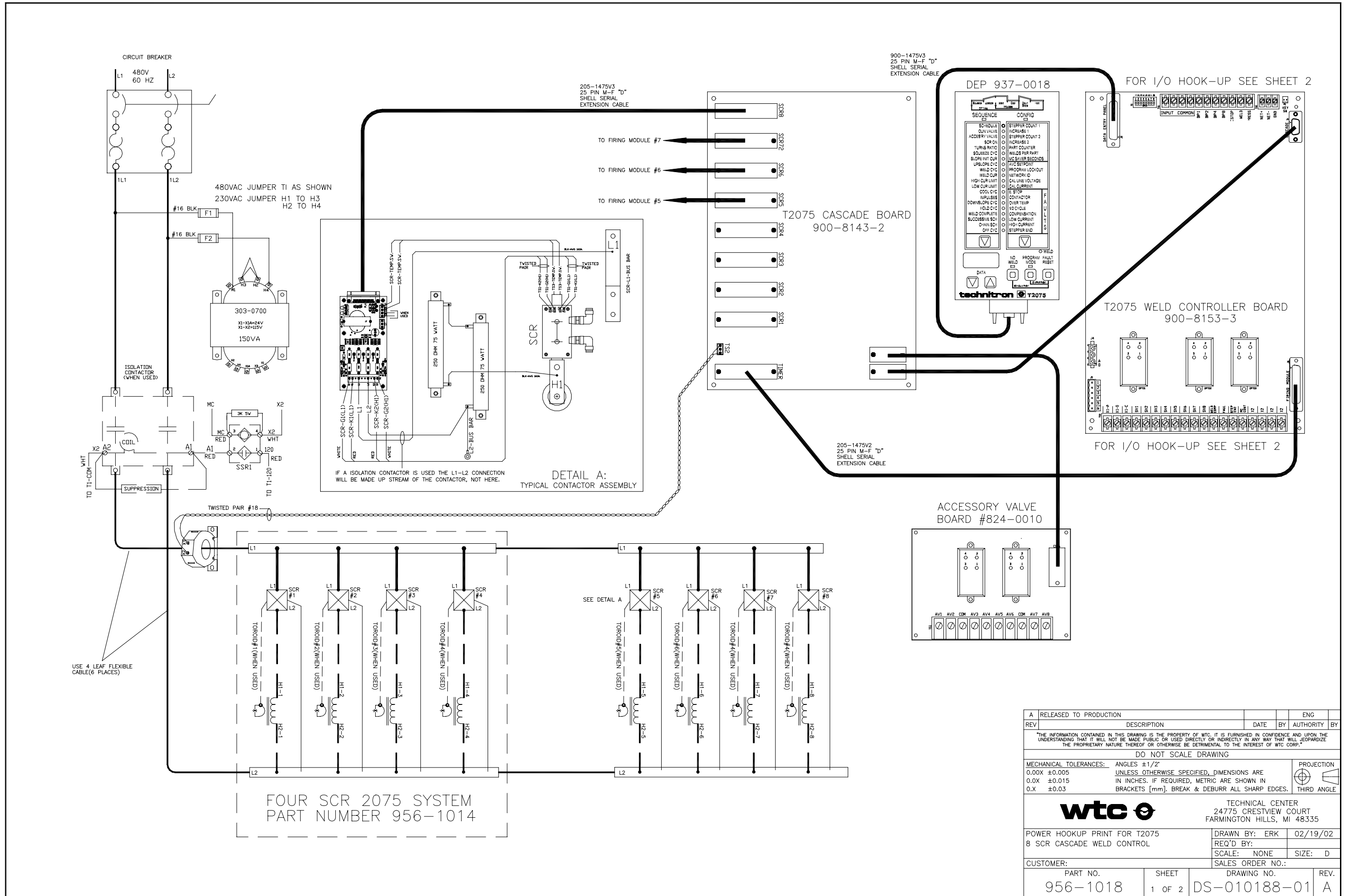
5. Assign Schedule #5 to release and eject the part:

<u>Function</u>	<u>Comment</u>
SCHEDULE=5	
GUN VALVE=0	;Turn off the clamp and gun before the ;clamp is energized.
ACCES'RY VALVE	;N/A
SCR=1	;N/A No weld time programmed
TURNS RATIO xxx	;N/A
SQUEEZE=40	;Give the clamp and electrodes time to ;open before ejection.
UPSLOPE CYC=0	;N/A
UPSLOPE CUR=20	;N/A
WELD CYC=0	;N/A
WELD CUR=20%	;N/A
HIGH CUR LIMIT	;N/A
LOW CUR LIMIT	;N/A
COOL=0	;N/A
IMPULSES=1	;N/A
DOWNSLOPE CYC=0	;N/A
HOLD CYC=10	;N/A
WELD COMPLETE=30	;Energize the ejector for a half-second to ;eject the part. Use the WCOMP output.
SUCCESSIVE SCH=0	;N/A
CHAIN SCH=0	;N/A
OFF CYC=0	;Off Single turns off all valves. The ;operation is complete.

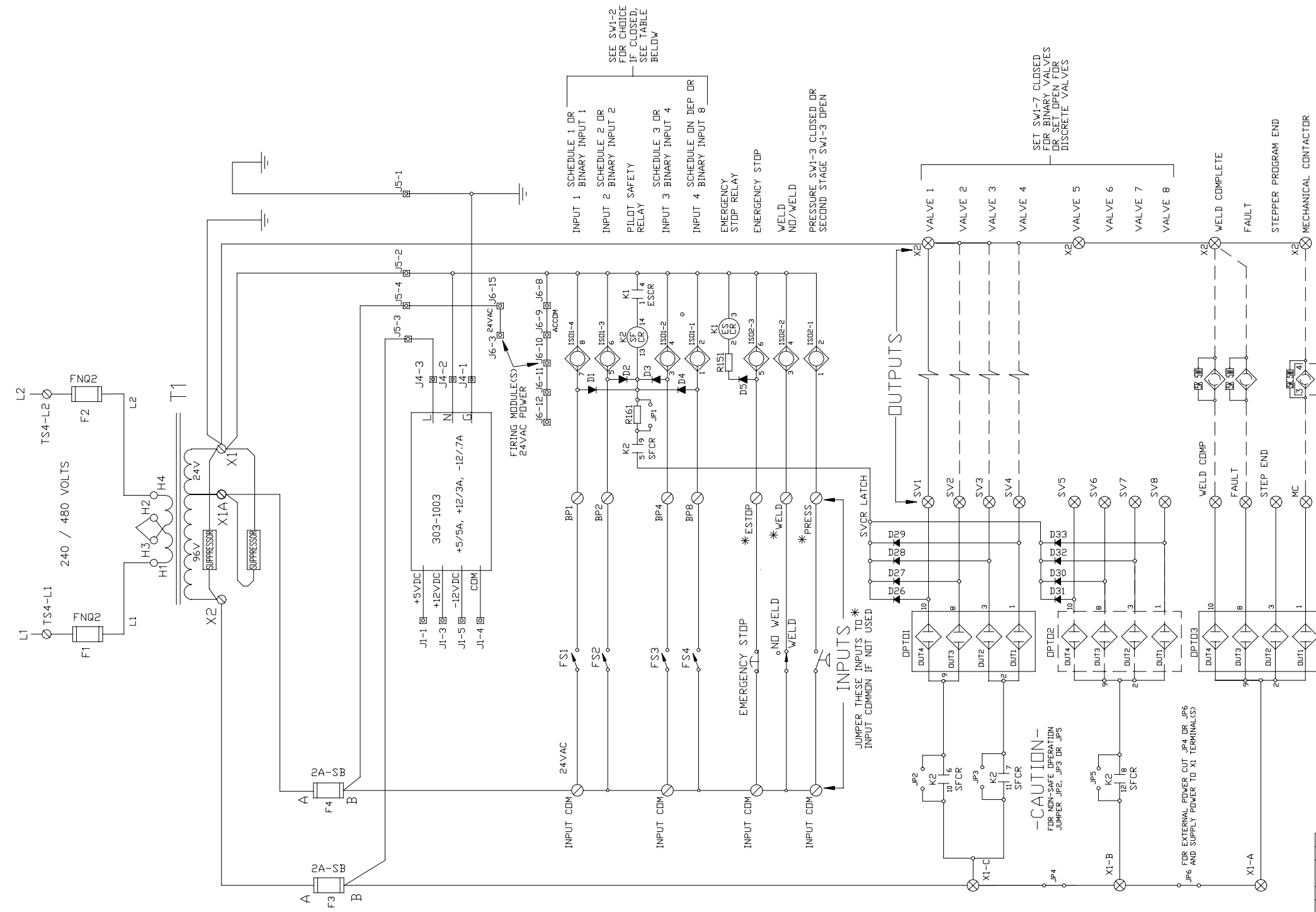
This completes the operation.

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A RELEASED TO PRODUCTION		ENG	BY	DATE
REV	DESCRIPTION	DATE	BY	AUTHORITY
<small>THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF WTC. IT IS FURNISHED IN CONFIDENCE AND UPON THE UNDERSTANDING THAT IT WILL NOT BE MADE PUBLIC OR USED DIRECTLY OR INDIRECTLY IN ANY WAY THAT WILL JEOPARDIZE THE PROPRIETARY NATURE THEREOF OR OTHERWISE BE DETRIMENTAL TO THE INTEREST OF WTC CORP.</small>				
DO NOT SCALE DRAWING				
MECHANICAL TOLERANCES:		ANGLES ±1/2°		
0.00X	±0.005	UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE		
0.0X	±0.015	IN INCHES. IF REQUIRED, METRIC ARE SHOWN IN		
0.X	±0.03	BRACKETS [mm]. BREAK & DEBURR ALL SHARP EDGES.		
wtc		TECHNICAL CENTER 24775 CRESTVIEW COURT FARMINGTON HILLS, MI 48335		
POWER HOOKUP PRINT FOR T2075 8 SCR CASCADE WELD CONTROL		DRAWN BY: ERK	02/19/02	
CUSTOMER:		REQ'D BY:	SCALE: NONE	SIZE: D
PART NO. 956-1018		SHEET 1 OF 2	DRAWING NO. DS-010188-01	REV. A



NOTE: SOME SOLID STATE INPUTS MAY BE SENSITIVE TO THE LEAKAGE OF THE T2075 OUTPUTS. A 5K 5 WATT RESISTOR PLACED ACROSS THE SOLID INPUTS MAY BE NECESSARY.

ISD-1 ON	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
ISD-1 BIN#	1	0	0	1	1	1	0	1	0	1	0	0	1	0	1
BP2 BIN#	0	1	0	1	1	1	0	0	1	0	0	1	0	0	1
BP3 BIN#	0	0	0	1	1	1	0	0	1	0	0	1	0	0	1
BP4 BIN#	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
BP5 BIN#	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

NOTE: IF DIP SWITCH SWI-2 IS CLOSED THE ABOVE TABLE APPLIES.

- NOTE:
- DPTO COMPILER ISD-1 THRU 3 PS2506-4
 - 359-0-0235-00 120VAC
 - 359-0-0236-01 24VDC (SOURCE)
 - 359-0-0261-00 24VDC (SINKING) - JUMPER SAFETY OR REVERSE DIODES
 - JUMPER JP1=24V FOR 24VAC/DC OUTPUTS
 - TS1 INPUT TERMINAL STRIP
 - TS4 TERMINAL STRIP
 - T-1 TRANSFORMER TERMINALS
 - TS3 OUTPUT TERMINAL STRIP

A RELEASED TO PRODUCTION		DATE	BY	ENG	BY
REV	DESCRIPTION				
THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF WTC. IT IS FURNISHED IN CONFIDENCE AND UPON THE UNDERSTANDING THAT IT WILL NOT BE MADE PUBLIC OR USED DIRECTLY OR INDIRECTLY IN ANY WAY THAT WILL JEOPARDIZE THE PROPRIETARY NATURE THEREOF OR OTHERWISE BE DETRIMENTAL TO THE INTEREST OF WTC CORP.					
DO NOT SCALE DRAWING					
MECHANICAL TOLERANCES:		ANGLES ±1/2°		PROJECTION	
0.00X ±0.005		UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE		THIRD ANGLE	
0.0X ±0.015		IN INCHES, IF REQUIRED, METRIC ARE SHOWN IN			
0.X ±0.03		BRACKETS [mm]. BREAK & DEBURR ALL SHARP EDGES.			
wtc			TECHNICAL CENTER 24775 CRESTVIEW COURT FARMINGTON HILLS, MI 48335		
I/O HOOKUP PRINT FOR T2075 CASCADE CONTROL WITH ANY NUMBER OF SCR'S		DRAWN BY: ERK		02/19/02	
		REQ'D BY:			
		SCALE: NONE		SIZE: D	
CUSTOMER:		SALES ORDER NO.:			
PART NO. 956-1018		SHEET 2 OF 2		DRAWING NO. DS-010188-02	
				REV. A	

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52